Paper AOP100-244

Controlling light to the limit with the dispersion-scan technique: from single-cycle pulses to biomedical imaging

Authors: H. M. Crespo, Universidade do Porto (Portugal)

Ultrashort laser pulses lasting for only a few femtoseconds (1 femtosecond = 10^-15 seconds) and containing only a few oscillations of the electric field are among the shortest optical phenomena ever generated and measured, and are finding a growing number of applications in science and technology. In the few-cycle regime, light-matter interactions exhibit a strong dependence not only on the intensity profile of the pulses but also on their electric field. Knowing and controlling the electric field of light is paramount for attosecond science (1 attosecond = 10^-18 seconds), which is providing direct access to the ultrafast dynamics of fundamental processes in matter, allowing for the ultimate control of physical systems and devices. Despite the huge potential and demonstrated impact of few-cycle pulses in cutting-edge research, their widespread use has been hampered by limitations and difficulties in pulse measurement technology.

The dispersion-scan (d-scan) technique presents a new paradigm in ultrashort pulse measurement and control that effectively came to solve many of the problems associated with traditional pulse characterization methods, enabling the measurement and compression of extreme femtosecond pulses comprising only a single oscillation of the electric field. These sources are now behind a variety of high-impact results and applications.

In this talk we will review key aspects of the technique and present recent d-scan-enabled applications and results, ranging from ultrafast spectroscopy to improved biomedical imaging, and the first all-optical measurement of the electric field of light itself.

Paper AOP100-245

Light diagnostics and Light treatments in the eye

Authors: S. Celestino Marcos, Instituto de Optica "Daza de Valdés" (Spain)

The talk will present an overview of optical techniques that are serving to better understand basic mechanisms of vision, and that have evolve into light, portable and user-friendly diagnostics tools in the ophthalmology clinic. Besides, better knowledge of the optical, morphological and biomechanical properties of the eye, and novel use of photo-activated techniques, is leading to new paradigms for treatment.

The talk will give some examples of light-based treatments that hold promise in the correction of prevalent ocular conditions

Paper AOP100-247

Open access to European photonics prototyping platforms for innovation-driven researchers: “ACTPHAST4R”

Authors: H. Thienpont, P. Doyle, D. Martindill, J. Vlekken, N. Debaes, Vrije Universiteit Brussel (Belgium)

In this presentation we introduce the unique opportunities created with the “ACTPHAST for Researchers” EC-supported project to provide researchers with open access to the best photonics prototyping platforms in Europe. “ACTPHAST4R” is a one-stop-shop photonics technology access and support centre which is perfectly aligned with the needs of innovation-driven researchers in bridging the gap between their fundamental proof-of-concept (TRL1-2) and a research prototype (TRL4-5). “ACTPHAST4R” will provide a critical mass of European top-class researchers -in particular non-photonics researchers for whom advanced photonics is a key enabling technology to the realisation of new applications and products- with action-oriented solutions on two complementary levels. In the first instance, ACTPHAST4R will provide researchers with one-stop-shop access to the photonics expert know-how and mature technologies of 24 of Europe’s leading competence centres. The photonics technology platform capabilities of ACTPHAST4R cover the entire integrated supply chain from design to packaging, and embrace technologies ranging from free-form optics, over optical fiber technologies, to photonic integrated circuits, and MOEMS. Through intensive technology coaching, leading to focused innovation projects involving transnational internships and hands-on working with the advanced photonics technologies at the access centers, the goal is to turn the researchers’ scientific conceptual breakthroughs into industrially- relevant demonstrators. In parallel, ACTPHAST4R will provide researchers with expert business coaching to help foster their entrepreneurial mindset and deployment capabilities, with guidance to pathways for further scaling of their demonstrators and financing of innovation in the industrial domain. Ambitious targets are set for commercial valorisation successes by “star performing” researchers in the form of patents, licensing deals and spin-outs. ACTPHAST 4R will be a game-changer for the European researchers in strengthening the European innovation ecosystem and improving the cross-fertilisation of photonics with other technology areas.